

Retiring the Network Spokesman: The Poly-Vocality of Free Software Networks in Peru

Anita Say Chan

National legislation to mandate the use or consideration of Free/Libre and Open Source Software (FLOSS) in government institutions is increasingly emerging as a strategy for FLOSS advocates in Latin America and the broader developing world. Such movements for the political use and regulation of FLOSS mark a distinct turn in the objectives and work of FLOSS advocates, whose activities largely focused on the dissemination of FLOSS as a technological artifact. This paper investigates the network of diverse actors involved in promoting FLOSS legislation in Peru, one of the first nations where a movement for FLOSS legislation emerged. It emphasizes that crucial to the work of FLOSS' network actors is not their merely technological productivity, but their cultural and political productivity – that is, their ability to produce diverse body of meaning made both evident and mobile in narratives of FLOSS use and adoption.

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In October 2005, the South American nation of Peru made international headlines when it passed an usual law that challenged the adoption of closed, proprietary software in government. The bill, one of the first of its kind, obligated 'technological neutrality' in public institutions' selection of software and required free and open source software (FLOSS) to be considered as an alternative to proprietary software when contracting software vendors. Its passage was celebrated by the Andean nation's free software community, who had long been advocating for state adoption of FLOSS. Four years earlier, a legislative

proposal — dubbed Proposition 1609 — was introduced in Peru's Congress to mandate FLOSS in state computers. Similar legal measures had begun elsewhere around the world, all seeking to establish alternatives to governments' use of closed, proprietary software. But it was Peru's legislative efforts that unlike any nation before it, managed to capture international attention.

Much of the publicity was spurred after Microsoft's General Manager in Peru attacked the bill as a 'danger' to the nation's security and to corporate intellectual property rights in 2002. Not long after, the US Ambassador to

Peru issued a threatening letter that reiterated Microsoft's disapproval of the bill's consideration, and warned its passage would harm U.S.-Peru relations. The congressional sponsor of the bill, Congressman Edgar Villanueva, nonetheless staunchly defended Proposition 1609 in a lengthy 12-page response. As Microsoft's interventions and Villanueva's response were circulated online, Peru and the Congressional sponsor of its FLOSS bill were suddenly transformed into prominently visible players in the global FLOSS movement. Or as one reporter from the online news publication Linux Today prophetically narrated:

In the course of everyday business and politics, once in a while something truly significant happens. At such a time, letters become road maps for change and a politician from a small mountain town in Peru can become a hero to those who believe in a cause: both amongst his countrymen, and around the rest of the world... Congressman Villanueva's reply [to Microsoft]... raised him practically to folk hero status over night. (LeBlanc, 2002).

Network spokesmen, network narrators

For many who witnessed FLOSS advance from its origins as an isolated practice of Western hackers to a globally-dynamic phenomenon that today is even endorsed by transnational technology corporations, the emergence of FLOSS legislation seemed unnecessary (Bessen, 2002; Evans, 2002; Hahn, 2002; Stanco, 2003). Western FLOSS advocates and policy makers urged governments to maintain a stance of political neutrality in software acquisition (Chan, 2004). FLOSS' rapid transition from the margins to the

mainstream of society, after all, seemed to occur without the aid of governments. Some FLOSS advocates and practitioners began to purport FLOSS as a species of 'disruptive technology' (Christensen, 2000) that would inevitably displace outdated technology (Bessen, 2002). To the commercial software industry, such readings signal the need for dramatic self-transformation to new technological environments. For FLOSS participants, it serves instead as reassurance that their current practices can proceed without change. Both framings, however, operate on a degree of technological inevitability, presuming that it will only be a matter of time before everyone came to see the objective, technical merit for FLOSS' use. Media coverage on FLOSS legislation similarly emphasized economic rationales for governments' FLOSS use, presenting it as a drastically cheaper alternative to closed, proprietary software and stressing that national poverty coupled with the potential for financial savings inevitably drove government interest in FLOSS (Dorn, 2003; Festa, 2001; Stocking, 2003; Wired.com, 2003).

A closer examination of the practices that surrounded the emergence of Peru's FLOSS legislation reveals that far from presuming FLOSS' steady advancement, the proponents of Peru's FLOSS bill had to undertake various forms of local and non-local work to advance their interests. Their practices departed from the language of technical and economic rationality that is repeatedly invoked to explain FLOSS' adoption. They insisted instead on a new framing of FLOSS as necessarily engaged with governance and political reform. And while many FLOSS advocates would adopt a stance of 'political agnosticism' (Coleman, 2003; 2004) that read ties to formal politics as counterproductive, Peru's FLOSS advocates actively sought to build relations with established political

channels. If many FLOSS supporters had asserted that FLOSS technologies would best spread without government intervention, Peru's legislative developments signaled a departure from such logics and suggested that something other than FLOSS' technological spread was of foremost concern.

This inquiry begins then with the intention of moving beyond a narrative of technological inevitability. I ask instead what made the proposal of Peru's FLOSS legislation and its emergence as a prominent site of FLOSS advocacy, even possible? What social and technological practices, work and relations were necessary for such events to be produced? What were the bodies of actors who operated to generate and distribute meaning around such events? What were the diverse constellations of meaning that were constructed through participant actions? And what, indeed, are we to make of the very multiplicity and cacophony of these accounting acts that all simultaneously 'speak for' the network?

For to peer beneath the surface of Peru's FLOSS movement is to reveal a network of actors, distributed through multiple national contexts, invested in and inventing a diversity of technical and discursive practices that advocate for political reform. Encompassing Latin American politicians, independent citizens and entrepreneurs working with FLOSS applications, local Linux and FLOSS user groups, Argentinean programmers, and Peruvian student activists, such a network functions as a poly-vocal system that fosters the emergence of new forms of civic expression and that argues for expanded spaces of political participation. This study will demonstrate how the force of Peru's FLOSS advocacy network relies fundamentally on its poly-vocality. I will

show how despite its un-coordinated nature, the network's discursive generativity nonetheless manages to challenge dominant assumptions on technological use and development.

Early formulations of networks in STS stressed how network successes depended on recruiting the consent of diverse human and non-human actors, whose productive activity would be coordinated through networks (Callon, 1986; Latour, 1987). These theorizations illuminated the ways that networks not only efficiently manage the labor of diverse actors, but also channel and represent actors' multiple interests. Central to this enrolment process is the work of effective translation such that a single party unifies interests, harmonizes voices, and becomes authorized to speak on behalf of the collective as a spokesman (Callon & Latour, 1981; Callon, 1986; Latour, 2004). Through these coordinations, the scientific facts and technological innovations associated with that party eventually achieve adoption and stabilization. Here, the strength of networks, measureable in its generation and dissemination of technological innovations, depends on the capacity to function coherently and employ spokesmen in the work of translation.

Research on the new economic productivity of networked activity has likewise emphasized networks as systems of technological innovation (Benkler, 2006; Castells, 1996; Lessig, 2001). Characterizing networks as loosely organized bodies that leverage new information technologies to organize the labor (rather than interests) of diverse parties, these approaches stress networks' surprising successes in channeling technological evolution. Such research has been especially important in

challenging established assumptions on technological innovation as dependent on tightly-coordinated, closely-managed, and hierarchically-organized production units. But here too, it is the network's capacity for coordinating innovation that primarily determines how its strength and durability are assessed.

My analysis into networks as poly-vocal bodies builds on the new research on FLOSS communities that attend to how the mutual accommodation and *production* of plurality serves as valuable testimony to the strength of networks (Benkler, 2006; Coleman & Hill, 2004; Keltly, 2005; Lin, 2007; Weber, 2004). This research involved 13 months of ethnographic fieldwork in the U.S., Peru, and Argentina, with half of that time spent based in Peru as I followed actors across their various sites of advocacy. I focused on actors who identified themselves as involved in advocating for the Peruvian FLOSS legislation. My preliminary research began in the U.S.A., where I began examining the activities of key actors, including the Peruvian Linux Users Group, the largest FLOSS-focused user group in Peru with over 1,500 subscribed members today, and the digital rights non-profit Via Libre (Free Path) Foundation in Cordoba, Argentina. This preliminary stage of research involved studying nearly 3,000 messages in archived contents and real time exchanges of both the PLUG and Via Libre listservs, interviews with organizers of those listservs, and participation in IRC channels with PLUG members. During the summer of 2003 and spring and summer of 2006, I relocated to Lima, Peru. During those months, I visited and interviewed government officials, NGO representatives, and programmers in both Lima and Cordoba. I also participated in more than a dozen FLOSS-focused conferences, in Lima

and five other provincial towns and cities across the country, that were co-organized by or targeted government officials. These included not only large, international- conferences, such as the first UNESCO-funded conference for the use of FLOSS in Latin American and Caribbean governments held in Cuzco in August 2003, but also small, community-focused, rural conferences promoting FLOSS in regional public offices, such as that held in the mountain town of Andahuaylas.

A consideration of the diverse spaces that FLOSS advocacy speaks to and with is especially critical when approaching its networks as a research object. Indeed, what an inquiry into Peru's FLOSS network reveals is that central to the network's performance is not merely the extension of FLOSS' technological artifacts, but the production of new discursive spaces, cultural meanings, and narratives that testify to the technical and political value of FLOSS. It reveals, in other words, how networks may function powerfully not just through their technological innovativeness or ability to unify multiple interests through a single, representative spokesman, but through their cultural innovativeness, discursive productivity and ability to multiply vocal sites and accounting acts.

Important too is how in interviews with Peru's FLOSS advocates, no single, coherent logic or explanatory account extended through all groups. Network actors' voices that is, insist on their own independent recognition and individualized integrity, and in doing so, refuse the election of a single representative that would collapse their multiple interests under a unified, harmonizing, representative voice. One hears instead a poly-vocal assemblage of stories that — in their simultaneous dynamicism and dissonance — reveals

Peru's FLOSS movement as built on a diversity of practices which at times intersect, but which never operate in complete conformity. Multiply positioned and independently speaking, network actors generate dynamic bodies of meanings about what FLOSS is, why it should be promoted, and what is ultimately at stake in its promotion. That such non-coordinated discursive practices would succeed in generating attention to Peru's FLOSS movement, is an outcome that network actors significantly profess to have no single explanation for. Indeed, no one actor's contribution is privileged in accounts offered by Peru's FLOSS advocates. And significantly, no single actor attempted to assume total credit for the network's impact. Politicians, NGO workers, and individual coders who participated in the movement instead continuously reference the work of others, distributing credit for the network's effect. To study a poly-vocal network calls attention to a multiplicity of contributions that extend lines of explanation. One has to be prepared, then, to find that the productivity of the network does not rest on the presence of centralizing spokespersons alone. It may even rest on expanding multiplicity and the absence of these central spokespersons.

Letters, legislation, and a disruption to the technological progress account

Superficially, Congressman Edgar Villanueva appears to be an unlikely proponent of FLOSS. He began his career in state politics as the mayor of Andahuaylas, a small, agriculturally-based town in the Andes Mountains. He was elected to Congress in 2001 and in his first year and a half in Congress, his legislative sponsorship focused on regional and

educational bills. Proposition 1609 stands out in Congressman Villanueva's record as the lone legislative action specifically addressing the use of software.

Presented before the Peruvian Congress in December 2001, Proposition 1609 proposed the mandatory adoption of FLOSS in Peru's government, making exceptions only where a developed enough FLOSS application was unavailable. Emphasizing the contemporary legal contradictions experienced by governments in software use, it stressed that states' reliance on computational processing in nearly all administrative activities forced governments into "a situation of dependency... [on] technology created in other countries". The bill further cited the rapidity of software updates, stressing that the frequency of new releases forced governments to choose between continually purchasing new licenses, operating with out-dated software, or piracy. It also referenced a government study that estimated Peruvian government's own use of pirated programs at 90% (INEI, 1999), and concluded that government must find alternatives to "[break] the vicious circle of dependency".

Proposition 1609 thus asserted legal and economic imperatives for the state to cease using closed, proprietary software. Moving beyond arguments for FLOSS' adoption on states' technological needs, Proposition 1609 asserted a political narrative that critically implicated external, global relations of dominance. Through the bill's account, global dynamics of power that privileged developed nation's interests were exposed as piercing the inner workings of Peruvian government. If adopting and even the cost-free pirating of closed, proprietary applications were previously perceived as government decisions that were of

relatively little consequence to citizens, Proposition 1609 pronounced them instead as deeply politicized, socially expensive choices that would re-inscribe the nation and polity into new cycles of dependence.

Within months of Proposition 1609's presentation to Congress, Microsoft, the primary software vendor for Peru, intervened. In a March 2002 letter addressed to Congressman Villanueva, Juan Alberto Gonzales, the General Manager of Microsoft Peru, issued his own projection of how FLOSS would fundamentally compromise the state. Positioning FLOSS as a technology of risk, Gonzales foretold a swarm of devastations that could be unleashed under Proposition 1609. He warned FLOSS would inflict immeasurable expenditures for technological migration, risk non-compatibility between Peru's public and private sectors, devastate corporate productivity, and hamper "the creativity of the entire Peruvian software industry" whose intellectual property rights would be compromised. Arguing, too, that state decisions over technology should remain politically neutral choices based on technical merit, Gonzales challenged, "If Open Source software satisfies all the requirements of State bodies, why do you need a law to adopt it? Shouldn't it be the market which decides freely which products give most value?" Crucially, the account he delivered of a future with FLOSS predicted conditions of economic and technical instabilities, and the devastation of what were presumed to be otherwise healthy political processes. Where Proposition 1609's account of an 'illegally' operating government stressed the forced piracy of software, Gonzales' evocation of governments' legal breaches instead emphasized the violation of laws to protect free enterprise.

Introducing the possibility of FLOSS' use in Peru's government produced a new narrative around processes of technology procurement. Such accounting practices not only insisted upon the politicized nature of state use of closed, proprietary software, pronouncing how such usages perpetuate relations of dependence. They also rendered FLOSS visible as an alternative that would disrupt such relations of inequality. Critically, the initial generation of a new interpretive account of technological possibility through FLOSS' introduction forced Microsoft to acknowledge the challenge to the established system of software procurement and to generate its own counter-narrative that defined FLOSS as a technology of risk. Whereas prior to the audibility of a FLOSS proposal, proprietary closed software appeared as the natural option, following FLOSS' proposition Microsoft it had to resituate itself within the language of security and rational choice.

The emergence of FLOSS legislation operates as a generative force, multiplying the narratives around code and the interpretations of what it would mean for Peru's public and private sectors. But indeed, the emergence of such accounts doesn't occur spontaneously, but is bound to other narrative bodies that flow through FLOSS' advocacy network. We may attempt to trace these narratives back, without ever discovering an explanatory thread that runs through them all, tying them together edge-to-edge, neatly. Some, in fact, were according to their tellers, brought into existence by complete accident.

Accounting for local government

It was an independent technological consultant for Peru's government, Jesus

Marquina Ulloa, who first brought the notion of FLOSS to the attention of Congressman Villanueva in 1996. Marquina, now 40, recalls that his work at the time involved routine visits to municipalities that hired him to implement tax administration software. Although he had originally developed the application using proprietary development tools, he had been begun coding an equivalent FLOSS application that he hoped would replace the proprietary version. Villanueva, then Andahuaylas' mayor, expressed interest in learning more about Marquina's proposals. They discussed first creating FLOSS applications for municipalities or organizing an association to offer basic services to local governments, and began to consider proposing legislation on a national scale when Villanueva was elected to Congress in 2000.

Still, it is Marquina's ties to local government that anchor his investment in FLOSS. He recalls that in his first years programming for regional governments, he used pirated copies of Microsoft's Visual FoxPro development tools and the data base development language Clipper to develop his applications. He remembers that the primary challenges he encountered were not technical, programming problems, but involved governments' general treatment of information:

There is a complete lack of standards in municipalities' tax procedures... Even though laws exist around taxing, they're truly very ambiguous ... only a few officials seem to understand it – so that many municipalities have their own interpretations.

Coding technological systems for government made Marquina increasingly

aware of the broader social conditions technologies were imbedded in. He also describes initially having to develop separate versions of his application for the five municipalities that contracted him.

[Each system] would have to be personalized since each municipalities' procedures are so distinct ... And I had to administer 100% of the source code by myself ... In the long term, the maintenance of the system becomes unsustainable.

He cites his own discovery of FLOSS and its principles of open code as a solution to local governments' technological dependence. He describes that providing municipalities access to programs' source code allowed them to innovate their own solutions.

[By] openly distributing code, instead of harming myself ... I actually started to enjoy benefits... In some municipalities, the responsible team would administer solutions to [technical] problems that would never have occurred to me, and with a rapidity that... was optimal.

Explicitly highlighting his experience of confronting internal disorganization and non-standardization within multiple municipal administrations, Marquina argues for FLOSS' use by governments as a technical solution to a problem he sees as socially generated. To Marquina, FLOSS' accessible source code empowers software developers and the local governments they work for by allowing them to customize code for diverse needs and evolving uses – many of which may not have been anticipated when technological systems were initially established.

But Marquina realized he was not alone in his frustrations with the limitations of proprietary, closed software. He had joined an Argentina-based mailing list to discuss issues of FLOSS in government shortly after his own discussions with Congressman Villanueva had helped to yield Proposition 1609 in the final months of 2001. The critical relations he cultivated from what could have otherwise been described as casual activity on the mailing list would extend Peru's FLOSS advocacy network.

Summoning citizens, democracy, and code

Several hundred miles outside of Lima, the Cordoba-based Via Libre Foundation, a NGO addressing concerns around technology and civil society, was already deeply involved in promoting FLOSS legislation in Argentina. The director of Via Libre, Federico Heinz, was instrumental in building relations with Argentinean Congressmen to sponsor the legislation. As critically, he had played a central role in building discussions around FLOSS in governments through a mailing list he helped to found in 2000 called *Proposición*. The list would in turn provide a critical mass of participants whose debates contributed to the evolution of the Argentinean bill. Recalling the processes around the bill's construction, Heinz references the processes of FLOSS construction, where online communities of programmers openly critique and exchange pieces of code to collectively build and refine, a working application. Heinz describes the lengthy, ten-month-long process of collective authorship:

We [at Via Libre] had hacked up some text and we brought it back to the list for it to be criticized until we reached

something that was acceptable ... It was an amazing process really, like a participative method of creating the law – with people stating how they would like to be ruled... this construction model of creating legislation as if it were software.

Although originally begun with the intention of promoting FLOSS in Argentina, the list and its participants—many of whom resided outside South America — grew to address the growing phenomena of FLOSS legislation by governments worldwide. Among the participants of *Proposición* who had approached Heinz about a local bill that he had helped to initiate in Peru was Jesus Marquina.

Heinz, another Argentinian participant on *Proposición*, Enrique Chaparro, and FLOSS advocates in Argentina were recruited again in Peru's efforts a few months later to respond to the Microsoft indictment of Proposition 1609. Heinz recalls that the primary challenge was managing the flood of feedback received from participants who all attempted to deliver their independent contributions simultaneously:

This kind of thing is a lengthy process... Everybody was contributing ideas and we had to continually write them down and make changes. And [then] when we posted the letter draft to *Proposición*, the people from the list had something to say about it [again]!

Nearly six-thousand words long and filling twelve, single-spaced pages, the response to the Microsoft letter produced from the collective efforts of the Argentinean advocates, *Proposición's* international participants, the Peruvian Congressman and Marquina, expanded upon the

arguments asserted in the Peruvian bill. It meticulously enumerated and refuted each of Gonzales' assertions. It reasserted the justification for Proposition 1609, specifying that the bill was not motivated by economic rationales but by the state's 'fundamental' political obligation to citizens. These included ensuring citizens' free access to public information and ensuring the permanence of public data, under the rationale that if governments were dependent on closed, proprietary software and afford proprietary software updates, public data would be compromised: "The state archives, handles, and transmits information which does not belong to it, but which is entrusted to it by citizens... The State must take extreme measures to safeguard the integrity, confidentiality, and accessibility of this information".

Heinz emphasizes the unexpectedness of the letter's final form, and the evolution of ideas generated through Proposition's dynamic debates:

What happened in the letter was an incremental process. In the start of the discussions, we looked at free software as a way to help government use software for less money... But gradually... we discovered that free software, even if it were more expensive [to maintain and implement] than proprietary software, public administrations *must* use it – that it is the only way it can achieve its goals.

Heinz explains that a consideration of the State's obligation to citizens was the crucial factor in transforming the authors' approach to FLOSS:

Better software and lower cost may be necessary for a corporation, but... corporations just have to be accountable

to shareholders. [Citizens] are all shareholders, though, in the state and it's not like a corporation where we can choose not to be. Cost is important but it is only secondary. When we began to think about the possible insecurities in government systems that store [citizens'] personal data, and the way this data is handled, I as a citizen have an interest in how this is guarded.

As crucial for Heinz was revealing the relationship between technology, governance and politics. Stressing the centrality of technological processes in shaping politics, he argues that limitations in technological and government transparency are directly related:

We are already waist deep in the information society – but... most people say all this free software stuff is just relevant to a bunch of geeks ... [But] software is a very important part of democracy. There are whole arenas, that no matter what the law says, if the software is implementing the law, it is software that has the upper hand.

And significantly, he stresses his own differences with what he sees as a dominant position within the larger FLOSS movement, which he characterizes as focused on legal reforms to benefit technological evolution. He reports that he has had trouble explaining the legislative strategy to a wider FLOSS community. He attributes such difficulties to the movement's focus on reforms in Western software patent and copyright law. And while he supports those strategies, he emphasizes that he sees other crucial objectives in FLOSS:

[T]his has to do with *citizenship* and free software... What we are trying to

achieve is not just [better] software, but a more sustainable society... And using free software is a tool in building that.

Heinz's accounting of the emergence of FLOSS legislation is not propelled by the same ideals of technological evolution that are evoked in the larger FLOSS movement, or by the users' technological freedoms that Marquina evoked. Rather, his narrative of FLOSS' imperative is anchored in notions of citizens' democratic rights in the emergent information society. Notably, Heinz draws from FLOSS principles that promote individual consumer freedoms and user rights, and re-situates these in the realm of collective political rights. To explain FLOSS, for Heinz, becomes a way of critiquing contemporary political structures and imagining a more democratic, participatory public sphere. The narrative he constructs is one built around the emergence of an information-based society where new sites of politics and governance express themselves, and where one such crucial site will exist as technology and code.

Articulating identities of possibility

While the exchanges between Congressman Villanueva, Marquina, and Via Libre were unfolding, another body of local FLOSS advocates, the Peru Linux Users Group (PLUG) in Lima, began to dedicate resources towards the bill's promotion. Founded as an online mailing list in late 1997, PLUG serves today as a virtual community of 1500 members that exchange technical information related to FLOSS use.

Cesar Cruz, a coordinator for PLUG's listserv and a 30-year-old Linux instructor, explains that he met Marquina at a Linux conference several years earlier.

He recalls casually hearing of the bill's proposal from Marquina by phone. After that conversation, Cruz decided to leverage PLUG's user base to launch their own independent campaign to promote Proposition 1609.

After debating online how PLUG would support Proposition 1609, members independently began the work of outreach, emailing contacts and news outlets inside and outside Peru. These publicity efforts brought news of the Peruvian bill to a broader international audience after copies of Proposition 1609's text, the Microsoft letter against it, and Villanueva's response were posted to the PLUG website in English and Spanish in April 2002. Wired Magazine published their account of the Peru movement shortly after in late April 2002 (Scheeres, 2002). This was followed by stories in UK-based tech news publications, The Register (Greene, 2002) and vnunet.com (Williams, 2002), and in the FLOSS news sites, Linux Journal (LeBlanc, 2002) and Slashdot (2002a; 2002b).

While international media coverage of Proposition 1609 spread, within Peru, little if any news appeared. Hoping to correct this, PLUG undertook various nationally-targeted activities, including distributing fliers on the street corners in Lima, hanging posters on public walls and buildings, and posting to Spanish-language FLOSS news sites about Peru's legislative developments. PLUG members also organized a conference on 'Linux and Free Software in the State' that featured Villanueva, Chaparro, Heinz, and the Mexican FLOSS advocate Miguel de Icaza.

Crucially, all of PLUG's activities were planned independently, without any direct communication with either Congressman Villanueva, Marquina, or Via Libre. And PLUG members invested

their own personal savings to fund activities. As Cruz explained,

I don't know how much money I spent [to promote Proposition 1609] – but neither do I care if it was a lot... Thanks to learning Linux, I've never been out of a job... In my country, it's difficult to find work, and if you do, it's often with a low wage. Thanks to Linux, I've done better than the majority of young Peruvians that are dedicated to computer [work].

Narrating his experience with FLOSS as allowing him to escape the professional difficulties other young technicians are plagued by, Cruz minimizes the personal expenditures he made. For him, financing PLUG's events allows him to support what he credits for his professional security. More than merely providing the material resources to further FLOSS' general growth, Cruz sees his support as directed towards FLOSS development Peru. Projecting a future of greater national and economic sovereignty built on the talents of Peruvian technicians, Cruz explains:

The most important thing to me is that we can develop our own technology. Before, we didn't have any possibility of this with proprietary software. Now with free software, yes, we do... In my country, there are few [software] developers [because] one always buys programs from abroad. There's a very large dependency on Microsoft, and we have to break this. Because we have the capacity to construct our own software... more than being about nationalism, I would say that this is about being able to get out of [a situation of] under-development.

Antonio Ognio, another PLUG list coordinator and the 28-year-old founder

of a Linux server company, similarly narrates his experience with FLOSS as one that expanded his professional opportunities. Recalling the last few years of his undergraduate education in systems engineering, he remembers feeling, "extremely bored" and having an "urgent need to re-invent" himself. Ognio says discovering FLOSS allowed him to transform himself and "materialize my goals and dreams":

I was told at university that [operating system] level programming was not for us. We should instead ... learn business administration [skills] and transition to a less technical job... I clearly remember my dean telling us not to dream of working with Bill [Gates] but to focus on solving enterprise problems. [But] of course I dreamed of being a great programmer... Why not think you can learn... the kind of "secrets" hackers would? Linux put me quickly in contact with all of that; programming, networking, security.

Pointing to the limitations they see as institutionally imposed on Peruvian technicians, both Cruz and Ognio build narratives around FLOSS that stress overcoming professional limitations and imagining new possibilities for growth. Discovering FLOSS for them permitted self-transformation and empowerment that are too many of their peers in Peru are denied. When imagined on the level of national use, FLOSS is read as offering potentials for economic sovereignty and political independence. FLOSS developer David Sugar (2005) echoes such hopes:

In providing opportunities for Latin American citizens to directly participate in the worldwide

commercial software market locally, free software offers incentives for forming a local software industry that can then compete on an equal basis with that of any other advanced country in the world.

Such interpretations of FLOSS are indeed distinct from those that Marquina stressed in his account of local government experiences, or Heinz's account of citizen rights. While the diverse accounting practices among network participants, however, emerge independently of one another, their differences do not contradict each another so much as invite their mutual co-extensions. Diversity in the FLOSS' poly-vocal network here appears as a generative and productive force, rather than a disruptive one.

Repercussions: A Microsoft and other interventions

By early summer 2002, following the wave of media coverage around the Villanueva-Microsoft exchange, several new developments in the Peruvian legislative efforts would unfold. Two new versions of Proposition 1609 would be introduced to the Peruvian Congress. And two new FLOSS bills would also be proposed. One sought to establish a Consulting Commission to study and authorize FLOSS' government use. The second sought to mandate FLOSS use by businesses whose primary client was government.

The proliferation of official FLOSS support would prompt Aldo Defilippi, the director of the American Chamber of Commerce of Peru, to write a letter to the President of the Peruvian Congress, decrying the bills for 'discriminating against' proprietary software companies.

Defilippi's letter to the president of the Peruvian Congress was followed by the U.S. Ambassador to Peru, John Hilton's letter, that warned that economically excluding companies like Microsoft would hurt an industry that created thousands of local jobs.

An in-person meeting between Peruvian President Alejandro Toldeo with Microsoft head Bill Gates in mid-July 2002, which ostensibly had nothing to do with Peru's FLOSS bills, effectively delivered on what Defilippi's and Hilton's letters had hoped to achieve. In mid-July, Peru's President met the Microsoft chairman in the company's corporate headquarters, where the leaders signed an agreement for Microsoft support of Peru's Project Huascarán, an initiative providing Internet access in Peru's rural schools. It also gave Gates the opportunity to present Toldeo with a donation of \$550,000 in money, software and consulting services. As the Microsoft press release for the event explained,

Microsoft will not be supporting Peru in its Huascarán Project alone, but in other important modernization projects of the public sector and nation... In addition to the support that Peru will receive for the Huascarán Project... Microsoft will also design and execute an Electronic Information System with the public sector, for better internal communication and more transparency in the services offered to Peruvian citizens, and will put into motion a practical tendency for the most modern countries of the world: e-Government. (2002)

Without a trace of the defensiveness and alarm that characterized his first letter to Villanueva, Juan Alberto Gonzales added his endorsement of the agreement in the

press release, characterizing Microsoft as a responsible, corporate 'civic actor' in the process:

Microsoft Peru knows its role in society, and we know that only an informed society will achieve development; and we feel that our function is to provide society with the technological resources that will permit the spreading of access to information to allow the creation of professional personnel and the development of its businesses.

Notably absent from either Microsoft or the Peruvian government's explanation of accord and the donation, however, was any mention of FLOSS or the various bills supporting it in Peru's Congress. Speculation began to emerge, however, that despite all official pretenses, the Toledo and Gates meeting and the Microsoft donation had secured a fate of rejection for the pending FLOSS proposals. Or as The Register's John Lettice would muse:

Where President Toledo's education and e-government deal [with Microsoft] leaves the Free Software initiative[s] is not clear. But as he must surely have a contract with Microsoft, it likely complicates [them]... When major Microsoft contracts or customers are in peril, Bill [Gates] is frequently deployed as the last weapon. (Lettice, 2002)

But the visibility of Peru's FLOSS efforts would invite other independent contributions with more welcome effects for its supporters as well. A recent study completed by the University of Maastricht's International Institute of Infonomics and funded by the European Commission on FLOSS development and use in the public and private sectors

drew its policy recommendations from the text of Proposition 1609 (Ghosh et al., 2002). Such borrowings occurred, of course, without coordinating with the original authors of the text. Reflecting back with surprise on the unexpected mobility Proposition 1609 saw, Federico Heinz muses,

It is very hard to do anything in free software that actually has any respect for national borders. Because you start doing something and other countries and places start picking it up and it becomes international in and of itself.

Heinz adds that as news of the legislative efforts in Peru spread globally, government officials from across Europe and Latin America began to approach the parties involved to begin similar initiatives.

Shortly after the Microsoft donation was presented, as well, officials from UNESCO approached Congressman Villanueva with plans to organize an international conference on FLOSS and Latin American governments. Held in Cusco, Peru in 2003, the conference featured tracks on international politics and the governing of FLOSS, FLOSS' economy, and FLOSS in education, science and culture.

And through less official channels, as well, the Peruvian legislative efforts would bear new impact. Following the media coverage of Villanueva's response to Gonzales' letter, FLOSS supporters from across the globe began to contact PLUG and Pimiento, a student-based FLOSS group in Lima that donated computer servers to support the heightened online demand for the documents related to the Peruvian efforts. Supporters volunteered their skills to translate Villanueva's letter into over a dozen languages, including Chinese, Turkish, Greek, Hungarian and Portuguese, allowing the Peruvian case

to acquire new mobility and audiences in each reproduction.

Perhaps not surprisingly, recognition as a network participant invites a heterogeneous array of new interventions that react to the network's varied discursive productions. Donations of money, time, institutional resources, and personal skills collide with other streams of activity, hoping to impact the network. For some givings, as with Microsoft's, it is the intention of eliminating or containing network activities that drive them. For others, it is amplifying the audibility and content of the network that propels them. And for others still, it is re-conducting the network and its dissonant chorus of voices that motivates them. Yet that such attempts to diminish, amplify or redirect the network see themselves as necessary bespeaks the collective force of the discrete voices flowing through the network. However internally disorganized, disunified and cacophonous Peru's polyvocal FLOSS network may be, it is still a thing that actors find they cannot afford *not* to react to.

Speaking for/through the network

Science studies brought early attention to the notion of networks as not mere formations of social association, but bodies of political representation. Bruno Latour and Michel Callon stressed how networks emerge from the work of successfully representing, or 'translating' the interests of diverse actors into a unified position, such that a particular actor can serve as the spokesperson for the whole (Callon & Latour, 1981; Callon, 1986; Latour, 1987; 2004). They specify that the work of translation encompasses all the negotiations and acts of "persuasion and violence" that allow a single actor

to emerge with the authority to speak or act on behalf of other actors: "Whenever an actor speaks of 'us', s/he is translating other actors into a single will, of which s/he becomes spirit and the relationship between spokesman. S/he begins to act for several, no longer for one alone. She becomes stronger. She grows" (1981: 297). Networks here demonstrate and manifest authority. They stabilize reality for the elements that are interconnected and associated through them, allowing a single actor to speak and act for the multitude, to "lay down a temporality and a space that is imposed on others". (1981: 287). So that if "before, the elements dominated by the actor could escape in any direction... now this is no longer possible. *Instead of swarms of possibilities*, we find lines of force, obligatory passing points, directions and deductions". [italics added] (1981: 287).

These authors also point to the ability of scientists to 'speak for' and politically represent the diverse human and non-human actors that they link together through translation (Callon & Latour, 1981; Callon, 1986; Latour, 2004). Their role as spokespeople for the natural world grants them a unique authority, "endow[ing them] with the most fabulous political capacity ever invented: They can make the mute world speak, tell the truth without being challenged, put an end to the interminable arguments through an incontestable form of authority that would stem from things themselves" (Latour, 2004: 14). In their unique role as spokesmen for the mute, natural world, scientific experts, however limited their numbers, are able to persuade wider circles of external actors and recruit new allies and resources. The greater the number of allies recruited, the further the network extends, and the greater the

strength and stability it accumulates. Through such strategies of recruitment, Latour specifies, “a handful of well-positioned men of science may rout billions of others” (1991: 181).

This crucial work of translation, however, is notably absent in the Peru’s poly-vocal FLOSS network. While the labor of network spokesmen should operate to stabilize particular perceptions of truth and fact, the discursive practices of Peru’s FLOSS advocates functioned to instead challenge what was considered established truths and multiply explanatory accounts. Likewise, if network spokesmen were to be employed to minimize ‘swarms of possibility’ in favor of constructing ‘obligatory passage points,’ it was precisely those new possibilities that Peru’s FLOSS advocates gave voice to. And while network spokesmen, as actors authorized to represent a multitude, should allow a few centrally positioned actors “to dominate from a distance” (1987: 243), Peru’s network actors disclaim any authority to speak on behalf of the whole, and instead continually reference the contributions of one another in acts that distribute credit.

Susan Leigh Star and James Griesemer (1999) likewise characterize scientific networks as constituted by a heterogeneous ecology of institutions. They stress however, how much of the key work of scientific networks is performed by actors other than the scientists at the center of the network. Emphasizing the contributions of participants situated outside the realm of professional science, the ecological approach they argue for, “does not presuppose an epistemological primacy for any one viewpoint... The important questions concern the flow of objects and concepts through the network of participating allies and social worlds” (1999: 507). Such an approach, the authors

assert, makes visible a “many-to-many mapping, where several obligatory points of passage are negotiated by several kinds of allies,” (1999: 507) who are tied together not by consensus-seeking immutable mobiles, but by flexibly interpreted boundary objects.

Highlighting the capacity of boundary objects to coordinate the activity of actors across distinct sites, the authors explain them as scientific objects shared across several intersecting worlds, “satisfying the informational requirements of each. Boundary objects are both plastic enough to adapt to local needs and constraints of the several parties deploying them, yet robust enough to maintain a common identity across sites... They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable means of translation” (1999: 509). There is no need for a spokesperson to represent the united voices of the parties who are organized through boundary objects. Actors instead maintain the integrity of their own interests, and networks accommodate the diverse interests of those actors linked through them. More than representing the consent of the diverse parties interlinked together as a unified and ordered whole, networks here express the pragmatic will of such parties to coordinate their activities in the interest of advancing a particular, shared goal. Diverse social worlds may organize themselves around boundary objects, but their coherence is not one that necessarily predicts long-term stabilization or the durability of a particular vision of reality. The network’s coherence here rather represents the intersection of social worlds and expresses the will to maintain social unity for sustained or short periods of time according to the needs of particular actors. And while relations

here are not dependent on a spokesman, it is the capacity to unite the interests of its diverse actors and generate coherence between actors at all, even if briefly, that explains the network's productivity. Such an account of network dynamics provide valuable insight into the dynamics of networks like that of Peru's FLOSS advocates for highlighting how technological innovation emerges not as the result of individual genius—of a lone Congressman, for instance—but through the participation of multiple interlinked parties. These parties in the case of Peru's FLOSS advocacy network included not only Peruvian Congressmen, but civil society-based NGOs, independent coders and programmers, and government-employed technicians. Assuring that such groups continue to perform simultaneously as a network is key to the sustained advancement and audibility of FLOSS advocacy. Still, it is the value of constructing a common shared position between multiple actors that is stressed through boundary object accounts. The dynamicism and value captured in the range of *differences* expressed by network actors, like those participating in Peru's poly-vocal FLOSS network, however, is here crucially absent.

More recent research on networked organizations build on these theoretical foundations of networks as representative bodies, stressing how the spread of new information technologies allows diversely situated, geographically dispersed actors to act collectively in networked social formations. Research on the proliferation of FLOSS communities has in particular been influenced by the notion of networks as collective bodies that emerge from the diverse, individual interests of its participants (e.g., Benkler, 2006; Coleman & Hill, 2004; Kelty, 2005; Lin, 2007; Weber, 2004).

Chris Kelty (2005) describes networks of geek socialities as both forms of representation that produce a language, folklore and technical code. Describing geeks as constituting a 'recursive public', he writes that the diverse actors associated with geek communities — including hackers, lawyers, activists, and IT entrepreneurs — are networked together based on their shared concern for the legal and technical possibilities for their own association. Yuwei Lin (2007) similarly points to the productivity of diversity in FLOSS communities, writing that heterogeneity serves as "the resource that helps mobilise the FLOSS innovation [and that] drives diverse actors to re/define and practice the hacker culture they perceive differently". Coleman and Hill (2004) likewise point to the multiple social groups and interests that organize themselves around FLOSS technologies. That such diverse parties as large, transnational technology corporations, anti-corporate political activists, and technology hackers share a common interest in FLOSS demonstrates its ability to perform as an 'iconic tactic', a strategic practice that is productive of other social and political practices. For Yochai Benkler, such diverse tactical uses of FLOSS are to be expected given that the networked information economy is built on the enhanced autonomy of individuals who are now given a "significantly greater role in authoring their own lives" (2006: 9). He and Steven Weber both point to the surprising economic and technological productivity that results from the aggregate of independent, voluntary acts of dispersed individuals (Benkler, 2006; Weber, 2004).

These more recent framings of network dynamics frame networks as social formations that accommodate and even foster political diversity and cultivate

new means of political expression. Rather than stabilizing reality these networks, much like Peru's poly-vocal FLOSS network, generate a plurality of discursive spaces and practices that call attention to new, still unrealized possibilities in law, economics, or culture. Networks here are not only bodies that represent and 'speak for' the collective of social and technical actors intertwined within them, but are bodies that also seek to express a collective will to challenge the conditions that structure contemporary life and to effect social and political change. Such an attention to the productivity of networks in generating new cultural codes and discursive practices is echoed in the work of social movement theorist Alberto Melucci, who emphasizes the difficulty in identifying a single operational logic to networks. Using the diffuse, fragmented structure of contemporary forms of collective action as his network model, Melucci writes:

One notes the segmented, reticular, and multi-faceted structure of movements. This is a hidden, or more correctly, latent structure; individual cells operate on their own entirely independently of the rest of the movement, although they maintain links to it through the circulation of information... Solidarity is cultural in character and is located in the terrain of *symbolic production* of everyday life. (1996: 115)

Constituted by a composite of diverse and potentially contradictory elements, networks here resist collapsing the plurality of their actors under a uniform body. Absent is a center of control or single explanatory axis. It is instead diverse, individually constituted goals that integrate themselves into and reinforce the network.

Networks here do not explain so much how social coordination or technological standardization are achieved, as how meaning can be extracted from the noise and cacophony of an ambiguous 'symbolic field'. Networks of collective actors operate not so much to distill or filter social ambiguity and complexity as to make such elements evident, and to unveil the taken-for-grantedness of naturalized categories. That social processes appear as standard and ordinary at all is an effect of political work that actors seek to reveal. "Bearing the banner on spontaneity, purity and immediacy of natural needs", Melucci asserts, "contemporary movements move to challenge the social and its reduction of differences to systemic normality" (1996: 96). Through their discursive generativity, network actors pronounce the artificiality of the natural, and make possible the recognition of the 'abnormal' as potentially a normal production.

Such an attentiveness to networks as discursively productive—and marked by their ability to create new cultural meanings as a means of contesting power and producing alternatives to dominant cultural meanings—has similarly been expressed by Latin American cultural studies scholars. They stress that by advancing alternative concepts of civic identity, citizenship and democracy, social movements succeed in unsettling dominant cultural meanings and political narratives and ultimately create new public spaces for collective protest (Alvarez, Dagnino, & Escobar, 1998; Canclini, 2001; Eckstein & Merino, 1998; Fox & Starn, 1997; Yudice, 1998). What these authors highlight is how network practices may operate to disrupt the dominant consensus, and destabilize what was established as 'common sense' through their discursive productions.

Network formulations that is, have shifted away an approach to networks as bodies of political representation that express the unification of diverse actors' voices, and instead draw attention to the plurality of voices that emerge from and are fostered by networks. Networks continue to serve as bodies that unite the social interests of diverse groups, but dependency on spokesmen is contingent rather than a given. In part, this can be explained by the fact that it is cultural change, and not primarily technological stabilization, that serve as organizing motivations of the poly-vocal network. Likewise, it is not the generation of a dominant, universalizable notion of truth and knowledge that network activities are channeled toward. Rather, participants' activity highlight what feminist science studies scholar Donna Haraway (1991) would call 'situated knowledges.' Such multiple, micro-knowledges, which frequently belong to those who have been denied political representation and privilege, insist on a form of "seeing from below" (1991: 192) that draws attention to the partiality of universalized notions of truth and in doing so, destabilize dominant conceptions of knowledge.

Indeed, my analysis of Peru's poly-vocal network underscores that central to network performance is not merely the production and extension of the technological artifacts of FLOSS, but the production of new cultural meanings, discourses, and narratives that account for the technical and political value of FLOSS. Among the varied practices that Peru's advocates construct around FLOSS, it is the absence of a desire for a uniformed standardization, or a purposefully managed coherence that one notes. Their voices render visible the limitations of established social and technical practice, and highlight the potential to pursue new

and distinct possibilities. Not surprisingly, the visibility of new alternatives likewise retains the potential to effect new, frequently unanticipated, repercussions. Perhaps what the unpredictability of these network effects make clear, then, is the utility of attending closely to the individual voices interlinked by networks, and of recognizing how network strength may be measured not merely in the degree to which uniform expression is achieved. Rather, its strength might be assessed in the degree to which such uniformity is undone and independence from the network spokesmen can be proclaimed.

Conclusion

There is little about the events that surrounded Proposition 1609 and its eventual passage as a technological neutrality law that incorporated elements from the array of FLOSS proposals that its Peruvian advocates consider inevitable. In asking Peru's advocates to reflect upon the outcomes of their efforts, it is a distinct lack of consensus that one hears about the degrees of success they achieved. Some, considering the long wait for the law's passage, the rejection of the other bills, and the altered language of the bill from obligating FLOSS' government use to obligating a stance of neutrality, lament that efforts among distinct parties could have been better coordinated. Antonio Ognio, for instance, tells me that,

We showed a great commitment and always supported with very specific goals... but we're lacking the time and conviction to sit down and talk about strategies and mid-term plans... We got the 'geek' community involved in politics... but we've failed to have it organized and go.

For others, however, it is the ability to have built and generated international publicity around the Peruvian efforts at all, that counts. Emphasizing the contribution made in simply having revealed new possibilities in social and technological conditions, Cesar Cruz tells me,

Each effort we made... was important. [B]ecause even if the bill hadn't passed, we've managed to make people pay attention to us and Linux... The principal thing in this moment is that each time more people know that there exist options, because before, everyone believed that Microsoft is the only technology, which just isn't true.

Filtering distinct events, effects and intentions, the incongruencies between network actors' modes of reassessment demonstrate the resistance to, or perhaps impossibility of, having any single explanatory account imposed upon the network. For in the case of Peru's FLOSS legislation, the network operates not so much in the interest of standardizing expression, meaning and practice, but functions to generate a multiplicity of stories around FLOSS that are themselves expressed in a heterogeneity of forms. Some such stories, as Villanueva's letter, travel widely and freely beyond the scope of their producers, adopted by other audiences, and serving as a catalyst for new modes of practice and analysis. Crucially, as well, the production and dissemination of such narratives becomes revealed as collective, distributed act, in which multiple parties independently participate and contribute to effects that they are only partly to credit for, and that they only partially control.

That these isolated explanations of activity on the network appear incomplete and unfinished, necessarily referencing other autonomous streams of activity in the network to explain themselves, however, is a sign that we may need to diversify our own theoretical accounts of network productivities. For Peru's poly-vocal FLOSS network urges us to consider the disparate meanings and discursive practices that flow around FLOSS as central to a network's performance. It prompts us to consider how it is not merely the production and extension of new technological artifacts like FLOSS that the strength of a network depends on, but also the production of new cultural meanings and narratives on which such durability depend. It reveals, in other words, how networks may function powerfully not just through their technological innovativeness and scientific productivity, but through a cultural and discursive productivity that, however, disordered, non-coordinated, and cacophonous, may nonetheless produce wider political effects. And it demonstrates how such productivity may be generated, even after having retired the network's spokesman.

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- Anita Say Chan
MIT, Program in Science,
Technology & Society
Cambridge, MA, U.S.A.
anital@mit.edu